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PATENT APPLICATION

ATTORNEY DOCKET NO. 200312792-1

Inventor(s): Tienteh Chen

Confirmation No.: 8388

Application No.: 10/769,385

Examiner: Elena Tsoy

Filing Date: 1/30/2004

Group Art Unit: 1792

Title: Surface Modification of Silica in an Aqueous Environment

Mail Stop After Final
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL LETTER FOR RESPONSE/AMENDMENT

Transmitted herewith is/are the following in the above-identified application:

- ☐ Response/Amendment
☐ New fee as calculated below
☐ No additional fee
☒ Other Amended Appeal Brief

- ☐ Petition to extend time to respond
☐ Supplemental Declaration

Fee \$ 0

CLAIMS AS AMENDED BY OTHER THAN A SMALL ENTITY						
(1) FOR	(2) CLAIMS REMAINING AFTER AMENDMENT	(3) NUMBER EXTRA	(4) HIGHEST NUMBER PREVIOUSLY PAID FOR	(5) PRESENT EXTRA	(6) RATE	(7) ADDITIONAL FEES
TOTAL CLAIMS	0	MINUS	00	= 0	X \$0	\$ 0
INDEP. CLAIMS	0	MINUS	0	= 0	X \$0	\$ 0
<input type="checkbox"/> FIRST PRESENTATION OF A MULTIPLE DEPENDENT CLAIM					+	\$0
EXTENSION FEE	<input type="checkbox"/> 1st Month \$120	<input type="checkbox"/> 2nd Month \$450	<input type="checkbox"/> 3rd Month \$1020	<input type="checkbox"/> 4th Month \$1590		\$ 0
OTHER FEES						\$ 0
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT						\$ 0

Charge \$ 0 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees.

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Typed Name: Brenda Wiseman

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Respectfully submitted,

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ART UNIT: 1792	AMENDMENT/RESPONSE CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8 DATE OF DEPOSIT: 04/25/2008 I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being facsimile transmitted to the USPTO or being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated above and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.  Brenda Wiseman
EXAMINER: Elena Tsoy	
APPLICANT: Tienteh Chen	
SERIAL NO.: 10/769,385	
FILED: 1/30/04	
CONFIRM. NO.: 8388	
DOCKET NO.: 200312792-1	
FOR: SURFACE MODIFICATION OF SILICA IN AN AQUEOUS ENVIRONMENT	

APPELLANTS' APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Mail Stop Appeal Brief - Patents

Sir:

Appellants submit this amended Appeal Brief in connection with their appeal from the final rejection of the Patent Office, mailed October 9, 2007, and the Notification of Non-Compliant Appeal Brief, mailed March 25, 2008, in the above-identified application. A Notice of Appeal was filed on February 4, 2008

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I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

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II. RELATED APPEALS AND INTERFERENCES

Appellants and Appellants' legal representatives know of no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

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III. STATUS OF CLAIMS

Claims 1-37 remain pending. Claims 23-37 have been withdrawn. The claims on appeal in this application are claims 1-22.

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IV. STATUS OF AMENDMENTS

No amendments to the presently pending claims have been made since the Office Action mailed on October 9, 2007, by which the final rejection of the pending claims was made.

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V. SUMMARY OF CLAIMED SUBJECT MATTER

1. (original) A method of treating silica in an aqueous environment (page 3, lines 1-2; page 8, lines 27-28), comprising:

a) dispersing silica particulates in an aqueous environment to form an aqueous dispersion (page 3, lines 2-3; page 8, lines 28-29);

b) reversing the net charge of a surface of the silica particulates from negative to positive using a surface activating agent, thereby forming surface-activated silica particulates dispersed in the water (page 3, lines 3-6; page 8, lines 29-32); and

c) contacting the surface-activated silica particulates with organosilane reagents to form reagent-modified and surface-activated silica particulates (page 3, lines 6-7; page 8, line 32 – page 9, line 2).

15. (original) A method of preparing an ink-jet media sheet (page 3, lines 9-10; page 9, lines 3-4), comprising:

a) dispersing silica particulates in an aqueous environment to form an aqueous dispersion (page 3, lines 2-3; page 8, lines 28-29);

b) reversing the net charge of a surface of the silica from negative to positive using a surface activating agent, thereby forming surface-activated silica particulates dispersed in the water (page 3, lines 3-6; page 8, lines 29-32);

c) contacting the surface-activated silica particulates with organosilane reagents to form reagent-modified and surface-activated silica particulates (page 3, lines 6-7; page 8, line 32 – page 9, line 2);

d) preparing a porous coating composition including the reagent-modified and surface-activated silica particulates and an organic binder (page 3, lines 10-12; page 9, lines 4-5); and

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e) coating the porous coating composition on a media substrate (page 3, lines 12-13; page 8, lines 5-6).

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VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issue presented for review is whether claims 1-22 are unpatentable under 35 U.S.C. § 103(a) as being obvious over U.S. Pat. No. 6,203,899 (hereinafter "Hirose") in view of U.S. Pat. No. 5,965,252 (hereinafter "Santo"), U.S. Pat. No. 5,372,884 (hereinafter "Abc"), and U.S. Pat. No. 3,007,878 (hereinafter "Alexander"), further in view of.

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VII. ARGUMENT

A. Appellants' invention

Appellants' invention is outlined in independent claims 1 and 15, which respectively read as follows:

"[a] method of treating silica in an aqueous environment, comprising:

a) dispersing silica particulates in an aqueous environment to form an aqueous dispersion;

b) reversing the net charge of a surface of the silica particulates from negative to positive using a surface activating agent, thereby forming surface-activated silica particulates dispersed in the water; and

c) contacting the surface-activated silica particulates with organosilane reagents to form reagent-modified and surface-activated silica particulates" and

"[a] method of preparing an ink-jet media sheet, comprising:

a) dispersing silica particulates in an aqueous environment to form an aqueous dispersion;

b) reversing the net charge of a surface of the silica from negative to positive using a surface activating agent, thereby forming surface-activated silica particulates dispersed in the water;

c) contacting the surface-activated silica particulates with organosilane reagents to form reagent-modified and surface-activated silica particulates;

d) preparing a porous coating composition including the reagent-modified and surface-activated silica particulates and an organic binder; and

e) coating the porous coating composition on a media substrate."

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B. The Asserted References1. The Hirose Reference

Hirose discloses a printing medium containing a liquid-absorbent base material; an ink-receiving layer consisting of a pigment, a binder, and a cationic substance; and a surface layer consisting of cationic ultrafine particles. See Abstract. Hirose exemplifies the ultrafine particles as two distinct and alternative species: first, as "silica subjected to a surface treatment with a compound containing some of the cationic metal oxides or metal atoms as described above," which were "magnesium, calcium, aluminum, zinc, chromium, iron, copper, tin, lead, and manganese," and second, as "silica subjected to a surface treatment with an organic compound having both amino group or quaternary ammonium group thereof and functional group having reactivity to a silanol group on the surface of the silica." See col. 4, lines 18-25. The Examiner also states that the cationized silica is formed either by treating it with a metal oxide or by treating it with organic compound having both an amino or quaternary ammonium group and a functional group. See February 6, 2006 Office Action, page 5; September 21, 2006 Office Action, page 3; and June 21, 2007 Office Action, page 3.

2. The Abe Reference

Abe discloses an ink-jet recording sheet comprising a support and ink receiving layer wherein the ink receiving layer contains a cation-modified non-spherical colloidal silica. See Abstract. The silica is cation-modified by coating the silica with a hydrous metal oxide such as hydrous aluminum oxide, hydrous zirconium oxide, or hydrous tin oxide as carried out by the methods in Alexander. See col. 2, lines 48-58. The Examiner describes Abe in the same fashion. See

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February 6, 2006 Office Action, page 5; September 21, 2006 Office Action, page 4; and June 21, 2007 Office Action, page 4.

3. The Alexander Reference

Alexander discloses the methods of making positively charged particles of dense silica by mixing them with a basic salt of a metal having a valence of 3 to 4, such as basic aluminum chloride. See col. 1, lines 11-16; col. 2, lines 21-26; col. 4, lines 9-11. The Examiner also states the Alexander teaches the "forming [of] a stable aquasol of positively charged coated silica particles." See February 6, 2006 Office Action page 5, last paragraph; September 21, 2006 Office Action, page 4; and June 21, 2007 Office Action, page 4, 5.

4. The Santo Reference

Santo discloses a printing medium comprising a substrate and an ink receiving layer. The ink receiving layer comprises an alumina hydrate surface-treated with a coupling agent. See Abstract. The coupling agent is preferably a silane coupling agent. See col. 7, lines 22-24. The Examiner also states that Santo teaches "an alumina hydrate surface-treated in an aqueous dispersion with a silane coupling agent" See February 6, 2006 Office Action, page 7; September 21, 2006 Office Action, page 4; and June 21, 2007 Office Action, page 4.

C. Rejections Under 35 U.S.C. § 103(a)

1. Requirements for Prima Facie Obviousness

The Examiner has rejected all of the pending claims under § 103(a) as being *prima facie* obvious over a number of references. The Patent and Trademark Office

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(PTO), through the Examiner, has the burden of establishing a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1998).

To satisfy this burden, the PTO must meet the criteria set out in M.P.E.P. § 706.02(j):

[T]hree basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Pack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Moreover, the obviousness analysis must comply with the statutory scheme as explained by the Supreme Court in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966), namely, consideration must be given to: (1) the scope and content of the prior art, (2) the differences between the prior art and the claimed invention, (3) the level of ordinary skill in the pertinent art, and (4) additional evidence, which may serve as indicia of non-obviousness.

An excellent summary of how the prior art must be considered to make a case of *prima facie* obviousness is contained in *In re Ehrreich et al.*, 220 U.S.P.Q. 504, 509-511 (CCPA 1979). There the court states that a reference must not be considered in a vacuum, but against the background of the other references of record. It is stated that the question of a § 103 case is what the reference(s) would "collectively suggest" to one of ordinary skill in the art. However, the court specifically cautioned that the Examiner must consider the entirety of the disclosure made by the reference and avoid combining them indiscriminately.

In finding that the "subject matter as a whole" would not have been obvious in *Ehrreich* the court concluded:

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"Thus, we are directed to no combination of prior art references which would have rendered the claimed subject matter as a whole obvious to one of ordinary skill in the art at the time the invention was made. The PTO has not shown the existence of all the claimed limitations in the prior art or any suggestion leading to their combination in the manner claimed by applicants." (underlining added)

It has been widely recognized that virtually every invention is a combination of elements and that most, if not all, of these will be found somewhere in an examination of the prior art. This reasoning lead the court, in *Connell v. Sears, Roebuck & Co.*, 220 U.S.P.Q. 193, 199 (Fed. Cir. 1983) to state:

"...it is common to find elements or features somewhere in the prior art. Moreover, most if not all elements perform their ordained and expected function. The test is whether the claimed invention as a whole, in light of all the teachings of the references in their entireties, would have been obvious to one of ordinary skill in the art at the time the invention was made." (underlining added)

With the above background in mind, Appellants contend that the Examiner has not met this burden with respect to any of the claims on appeal. Particularly, Appellants submit that the PTO has failed to show that each and every element of the claimed invention is contained in the combined references. Appellants now turn to a discussion of the specific rejection at issue, and the references on which they are based.

2. The Rejection of Claims 1-22 over Hirose in view of Santo, Abe and Alexander

The Examiner has rejected claims 1-22 using a combination of the aforementioned four references; Hirose, Abe, Alexander, and Santo. Each claim is directed to a method that requires at least three specific steps. First, the silica is dispersed in water. Second, the silica's negative charge is reversed by a surface-

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activating agent forming a surface-activated silica. Third, the surface-activated silica is then reacted further with an organosilane reagent to form a reagent-modified and surface-activated silica. Dependent claims 2-4 vary the order of the first two steps of the method, but the reagent-modifying step is always performed such that the organosilane reagent is attached to the surface-activated silica. This requires that the surface-activated silica exist before or as the organosilane reagent is attached.

The rejection based on the combination of Hirose, Santo, Abe and Alexander fails to teach each and every element of the present invention. Specifically, the combination of references fails to teach at least (a) modifying a pre-modified silica particle, (b) cationizing a surface of silica and modifying the silica with organosilane reagent, and (c) the organosilane reagents contacting surface-activated silica particulates.

First, none of the cited references teach the present process, nor do they teach modifying a pre-modified silica particle. The present invention modifies silica by reversing the net charge by using a surface activating agent and also further modifies the surface-activated silica particulates by contacting them with organosilane reagents to form reagent-modified and surface-activated silica particulates. All of the references cited are directed towards surface modification by traditional methods.

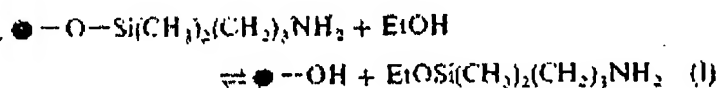
The Examiner has combined three silica references with an alumina reference. Hirose, Abe, and Alexander are silica references, each referring to silica particles and specifically teaching silica surface treatment. Notably, Hirose, Abe, nor Alexander teaches further modification of the treated silica particle. Santo is directed to alumina particles and does not discuss surface treatment of silica particles, let alone modifying silica particles twice.

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The Examiner has compared the alumina hydrate of Santo to the coated silica of Hirose, Abe, and Alexander. However, as discussed at length in previous responses (see Response dated September 6, 2007, August 22, 2006; Response dated December 21, 2006; and Response dated May 17, 2007), such a comparison is improper. Hirose teaches similar chemistry to Santo; the difference being one is a silica particle and the other is an alumina particle. The Examiner, in an attempt to combine the references to meet the presently pending claims, has compared an aluminum hydrate used to form a surface activated silica particulate (i.e. a coating) to an alumina hydrate particle. Therefore, Hirose, Abe, and Alexander can be viewed as being directed to activating a silica particle with a surface activating agent, and Santo is directed to surface-treating alumina hydrate particles.

The actual surface chemistry consists of oxygen on the surface of the particle bonding to the silicon atom as the ethoxy group leaves as represented in the following reaction scheme (I):



Where \bullet represents the silica

The Examiner has taken issue with the above reaction schematic. Specifically, the Examiner has "take[n] official notice that it is a common knowledge in the art that aminoalkylethoxysilane (which is conventional silane coupling agent) bonds to the surface having OH groups by reacting ethoxy groups with OH groups, as evidenced by Hirose" See Advisory Action dated December 21, 2007, page 5. However, the Appellants submit that the Examiner has precisely described the above reaction schematic. As shown above, the silica has an OH group that is reacted with the

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ethoxy group of the aminoalkylethoxysilane, which is exactly the same as described in Hirose.

At best, Hirose in view of Abe/Alexander discloses a partially covered silica particle surface-activated by basic aluminum chloride in an aqueous environment while the surface of Santo would teach a similarly modified alumina particle. These surfaces are not the same. Contrary to the Examiner's prior assertions, the alumina hydrate disclosed in Santo is not the same basic aluminum chloride disclosed in Alexander; this point is discussed in detail below. Regardless of the alumina issue, neither separately nor in combination do the references teach modifying a pre-modified silica particle. The Examiner has further stated that Santo demonstrates the advantages of the sequence of steps claimed by Appellants. However, Appellants assert that this is not true, in that Santo does not represent any of the steps in the present claims. Santo teaches organosilane modification of the surface of an alumina particle, while the present claims recite organosilanes contacting the cationized surface of silica particles.

Second, by the Examiner's own admission, Hirose "fails to teach that (i) colloidal silica particles are treated first with alumina or alumina hydrate so that a negative charge on its face changes to a positive charge forming cationized silica then the cationized silica having on its surface alumina or alumina hydrate is contacted with the organosilane reagent to form organosilane modified cationized silica; (ii) colloidal silica particles are treated with the cationic alumina and alumina hydrate by dispersing silica particles in an aqueous environment to form an aqueous dispersion." See September 21, 2006 Office Action, page 3; see also June 21, 2007 Office Action, page 3. Santo fails to teach cationizing the surface of silica. Therefore, neither

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teaches the element of cationizing the surface of silica and modifying silica with organosilane reagent.

Even though the Examiner has asserted that the claimed sequence is *prima facie* obvious, the Examiner has shown no support for the truth of such an assertion as applied to the present invention. As the Appellants has pointed out throughout the prosecution, methods are unique in that finding one claim aspect or step here, and another there does not, in and of itself, necessarily disclose the method to one of ordinary skill in the art. This is particularly true with chemical methods or processes, wherein the steps are often inter-related. With organic chemical reactions, it is notable that the starting materials are to be compatible with the reaction scheme. Varying starting material or solvents can have negative effects on the resulting product in any given scheme. Appellants have previously cited one example of this principle, i.e. Grignard reactions, where disregarding the proper protocol can yield disastrous results. See e.g. Response dated September 6, 2007. Similarly, in the present reaction method, though not dangerous, a failure to perform this precise method could result in mixing the functional groups of the organosilane reagents with metal oxides or aluminum hydrates, which may not be compatible. Further and more importantly, failure to perform the precise method may not lead to the reagent-modified and surface-activated silica particulates as required by the present claims.

The Examiner has argued that "a proper sequence of adding ingredients to obtain the most satisfactory mixture is within a skill of a person of ordinary skill in the art, and such a choice does not involve invention." See June 21, 2007 Office Action, page 3. However, such a statement assumes that a reference or combination of references provides all of the steps. That is not the case here, where none of the references provides all the present steps of independent claim 1 or 15 regardless of

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order, as further explained below and in the next section. Additionally, the Examiner has combined four references to provide the instant rejection, but has not provided any apparent reason that a person skilled in the art would modify the individual teachings of these four references and combine them in the presently disclosed order to achieve the present reaction scheme. Furthermore, Appellants contend that even an attempt to modify the references based on the teachings of the references would still fail to disclose each and every element of the present claim set.

Specifically, Appellants contend that the present steps outlined in the independent claims are not arbitrary and require one specific sequence in order to arrive at the present invention. Although the Examiner has alleged that such a sequence is obvious; see June 21, 2007 Office Action, page 7; such is not the case. Furthermore, it is not obvious to combine the two distinct treatments disclosed in Hirose based on the teachings of Hirose, let alone modify the disclosure of Hirose to sequence them. To be clear, Hirose teaches that silica can be treated with a metal oxide or treated with organic compound having both an amino or quaternary ammonium group and a functional group, as noted by the Examiner throughout this prosecution. See, e.g. February 6, 2006 Office Action, page 5; September 21, 2006 Office Action, page 3; and June 21, 2007 Office Action, page 3. As such, Hirose teaches that these steps provide the same purpose, i.e., obtaining cationized silica, and therefore, Hirose effectively teaches away from combining these two distinct steps. In other words, since Hirose teaches that either step can be used, there is no apparent reason one skilled in the art would perform both steps.

As Appellants have raised the issue of teaching away, Appellants would like to review the current case law regarding teaching away for the Board's convenience. The Court of Appeals for the Federal Circuit has clearly stated that "an applicant may

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rebut a prima facie case of obviousness by showing that the prior art teaches away from the claimed invention in any material respect." *In re Petersen*, 315 F.3d 1325, 1331 (Fed. Cir. 2003). The Court has also stated that "[w]e have noted elsewhere, as a 'useful general rule,' that references that teach away cannot serve to create a *prima facie* case of obviousness." (emphasis added) *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1354 (Fed. Cir. 2001).

As previously noted, none of the references teach the element of cationizing the surface of the silica and modifying the surface-activated silica particulates with organosilane reagent. The Examiner has included the combination of Hirose, Abe, and Alexander to teach cationizing the surface of silica. Santo has been included in an attempt to remedy the deficiency in teaching contacting the surface-activated silica particulates with organosilane reagents. It is the Appellants' position that Santo does not teach contacting the surface-activated silica particulates with an organosilane reagent, however, assuming *arguendo* that Santo did teach this element, it does not teach cationizing the surface of silica. On the other hand, the combination of Hirose, Abe, and Alexander does not teach contacting the surface-activated silica particulates with organosilane reagents. In other words, the step of contacting the surface activated silica particles with an organosilane reagent cannot be present in any of the references, because none of the references teach both types of treatment, and thus, this interconnection of steps cannot be taught by the cited references.

Further, the present claims are directed to methods, and as such, finding one claim aspect or step here, and another there does not, in and of itself, necessarily disclose the method to one of ordinary skill in the art. In the present case, the Examiner has allegedly identified one aspect of the method in a combination of three references, and allegedly identified another aspect in still a different reference. Both

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the reversing the net charge of the surface of the silica particulates and the contacting the surface-activated silica particulates with organosilane reagents are necessary to produce reagent-modified and surface-activated silica particulates. The cited references do not teach the required claim element of cationizing the surface of the silica and then modifying the surface-activated silica particulates with organosilane reagent. No reference teaches modifying surface-activated silica with an organosilane reagent. Given that as a general principle of organic chemistry proper reaction sequence is important and often critical, and that the references cited by the Examiner do not teach or suggest the claimed collocation of steps or their claimed sequence, Appellants assert that there is no *prima facie* case for obviousness of the present claims.

Third, the combination of references cited by the Examiner fails to teach organosilane reagents contacting surface-activated silica particulates to form reagent-modified and surface-activated silica particulates. Hirose, Abe and Alexander are silica references. Each refers to silica particles and specifically teaches silica surface activation. Santo, on the other hand, is directed to alumina particles and not to coatings. Santo teaches alumina particle surface activation. The Examiner continues to rely on alumina hydrate particles of Santo and alumina hydrate coated particles of Hirose being the same. They are clearly not.

As previously argued in past office action responses, Santo teaches a surface-activated aluminum hydrate. To be clear, alumina hydrate is not the aluminum chloride hydrate as found in the Applicant's disclosure. Alumina and aluminum are distinct in this context; the first referring to a particle and the later referring to an individual atom which is part of a chemical molecule. Specifically, in Santo, alumina is a particle having "pore properties" "within a range of from 0.1 to 1.0 ml/g" and a

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"specific surface area" "of from 40 to 500 m²/g." See col. 4, lines 15, 19-21, 25-26. The surface of the alumina can be modified to have Al-O, Al-OH, or Al-H as well as an Al-silane coupling agent. See col. 3, lines 60-65; col. 4, lines 39-43. Therefore, the alumina activated surface of Santo and the silica activated surface of Hirose, Abe, and Alexander are similar in at least one way, in that they both include particles that have chemicals attached thereto. The aluminum chloride hydrate of the present invention is more of a chemical coating, whereas the alumina hydrate of Santo is a particle.

The Examiner has responded to the above argument, acknowledging that Santo teaches alumina hydrate particles, but alleging that the surfaces of the particles of Santo and Hirose are the same. See Advisory Action dated December 21, 2007, page 4. However, given the admission that the references describe two different particles, the surfaces cannot be entirely the same. In other words, Santo discloses an entire surface of Alumina where as Hirose, Abe, and Alexander would have a Silica-Alumina surface. Regardless of this distinction, Appellants submit that the arguments contained herein are still valid.

The present invention is directed to a method that includes an organosilane reagent attaching to the surface-activated silica, which requires that the surface-activated silica exist before or as the organosilane reagent is attached. The surface activating agent, aluminum chloride in the above discussion, serves more of a coating in the present invention, and is therefore distinct from the alumina chloride of Santo.

Therefore, the Appellants submit that the Examiner has failed to present a *prima facie* case of obviousness for lack of teaching all the claim limitations in the instant application. Specifically, the combination of references fails to teach (a) modifying a pre-modified silica particle, (b) cationizing surface of silica and modifying silica with

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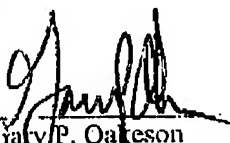
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organosilane reagent, and (c) organosilane reagents contacting surface-activated silica particulates, all taught and required by the present claims. As such, Appellants submit that these claims present patentable subject matter, and that the rejections of these claims should be overturned.

D. Conclusion

Appellants respectfully submit that the claims on appeal set forth in the Appendix are patentably distinct from the asserted prior art reference. Particularly, the present combination of Hirose, Abe, Alexander, and Santo does not teach each and every element of the presently claimed invention within the meaning of 35 U.S.C. § 103(a). For at least these reasons, Appellants respectfully request that the Board of Appeals reverse the rejection and remand the case to the Examiner for allowance.

Dated this 25th day of April, 2008


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VIII. CLAIMS APPENDIX

1. (original) A method of treating silica in an aqueous environment, comprising:
 - a) dispersing silica particulates in an aqueous environment to form an aqueous dispersion;
 - b) reversing the net charge of a surface of the silica particulates from negative to positive using a surface activating agent, thereby forming surface-activated silica particulates dispersed in the water; and
 - c) contacting the surface-activated silica particulates with organosilane reagents to form reagent-modified and surface-activated silica particulates.
2. (original) A method as in claim 1, wherein the aqueous dispersion includes the surface activating agent prior to the dispersing step, and wherein the reversing step occurs as the silica particulates are dispersed in the aqueous dispersion portion-wise.
3. (original) A method as in claim 1, wherein the surface activating agent is added to the aqueous dispersion after the silica particulates.
4. (original) A method as in claim 1, wherein the dispersing step and the reversing step occur as the silica particulates and the surface activating agent are added to the aqueous environment simultaneously.
5. (original) A method as in claim 1, wherein the aqueous dispersion includes from 10 wt% to 40 wt% silica particulates.

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6. (original) A method as in claim 1, wherein the dispersing step further comprises the use of a high shear or high torque mixer.

7. (original) A method as in claim 1, wherein the aqueous dispersion includes silica particulates having an average size from 10 nm to 500 nm.

8. (original) A method as in claim 1, wherein the surface activating agent is aluminum chloride hydrate.

9. (original) A method as in claim 8, wherein the aluminum chloride hydrate is present in the aqueous dispersion at from 2 wt% to 20 wt%.

10. (original) A method as in claim 1, wherein the surface activating agent is a trivalent or tetravalent metal oxide.

11. (original) A method as in claim 10, wherein the trivalent or tetravalent metal oxide is adsorbed on the surface of the silica particulates.

12. (original) A method as in claim 1, wherein the organosilane reagents are amine-containing silanes.

13. (original) A method as in claim 12, wherein the amine-containing silanes include quaternary ammonium salts.

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14. (original) A method as in claim 1, further comprising the steps of monitoring and maintaining pH at a predetermined level during the contacting step.

15. (original) A method of preparing an ink-jet media sheet, comprising:

a) dispersing silica particulates in an aqueous environment to form an aqueous dispersion;

b) reversing the net charge of a surface of the silica from negative to positive using a surface activating agent, thereby forming surface-activated silica particulates dispersed in the water;

c) contacting the surface-activated silica particulates with organosilane reagents to form reagent-modified and surface-activated silica particulates;

d) preparing a porous coating composition including the reagent-modified and surface-activated silica particulates and an organic binder; and

e) coating the porous coating composition on a media substrate.

16. (original) A method as in claim 15, wherein the aqueous dispersion includes from 10 wt% to 40 wt% silica particulates.

17. (original) A method as in claim 15, wherein the surface activating agent is aluminum chloride hydrate.

18. (original) A method as in claim 17, wherein the aluminum chloride hydrate is present in aqueous dispersion at from 2 wt% to 20 wt%.

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19. (original) A method as in claim 15, wherein the surface activating agent is a trivalent or tetravalent metal oxide.

20. (original) A method as in claim 19, wherein the trivalent or tetravalent metal oxide is adsorbed on the surface of the silica particulates.

21. (original) A method as in claim 15, wherein the organosilane reagents are amine-containing silanes.

22. (original) A method as in claim 21, wherein the amine-containing silanes include quaternary ammonium salts.

23. (withdrawn) Treated silica particulates for use in ink-jet media coatings, comprising silica particulates being surface-activated by a surface activating agent selected from the group consisting of an aluminum chloride hydrate, a trivalent metal oxide, a tetravalent metal oxide, and combinations thereof, and wherein the said silica particulates are also reagent-modified by an organosilane reagent.

24. (withdrawn) Treated silica particulates as in claim 23, wherein the silica particulates are from 10 nm to 500 nm in size.

25. (withdrawn) Treated silica particulates as in claim 23, wherein the organosilane reagent is an amine-containing silane.

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26. (withdrawn) Treated silica particulates as in claim 25, wherein the amine-containing silane includes a quaternary ammonium salt.

27. (withdrawn) Treated silica particulates as in claim 23, wherein the silica particulates are surface-activated and reagent-modified in an aqueous environment.

28. (withdrawn) Treated silica particulates as in claim 23, wherein the surface activating agent is aluminum chloride hydrate.

29. (withdrawn) A media sheet having a treated silica particulate-containing coating, comprising:

a) a porous coating composition, including:

i) treated silica particulates being surface-activated by a surface activating agent selected from the group consisting of an aluminum chloride hydrate, a trivalent metal oxide, a tetravalent metal oxide, and combinations thereof, said treated silica particulates also being reagent-modified by an organosilane reagent, and

ii) a binder admixed with the treated silica particulates; and

b) a media substrate having the porous coating composition coated thereon.

30. (withdrawn) A media sheet as in claim 29, wherein the silica particulates are from 10 nm to 500 nm in size.

31. (withdrawn) A media sheet as in claim 29, wherein the organosilane reagent is an amine-containing silane.

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32. (withdrawn) A media sheet as in claim 31, wherein the amine-containing silane includes a quaternary ammonium salt.

33. (withdrawn) A media sheet as in claim 29, wherein the media substrate is photobase or paper.

34. (withdrawn) A media sheet as in claim 29, wherein the silica particulates are surface-activated and reagent-modified in an aqueous environment.

35. (withdrawn) A media sheet as in claim 29, wherein the surface activating agent is aluminum chloride hydrate.

36. (withdrawn) A system for printing ink-jet images with minimal dye mobility, comprising:

a) a media sheet having a porous coating composition, including:

i) treated silica particulates being reagent-modified and surface-activated in an aqueous environment, wherein the treated silica particulates have a net positive charge,

ii) a binder admixed with the treated silica particulates to form the porous coating composition, and

iii) a media substrate having the porous coating composition coated thereon;
and

b) an ink-jet ink having an anionic dye colorant configured for being printed on the media sheet.

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37. (withdrawn) A system as in claim 36, wherein the treated silica particulates are surface activated by a member selected from the group consisting of an aluminum chloride hydrate, a trivalent metal oxide, a tetravalent metal oxide, and combinations thereof, and wherein the treated silica particulates are reagent-modified by aluminum chloride hydrate.

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IX. EVIDENCE APPENDIX

(No matter presented)

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X. RELATED PROCEEDINGS APPENDIX

(No matter presented)